DOCUMENT RESUME

ED 207 909 SO 013 636

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TITLE The Future, Extraterrestrial Space Humanization and Sociology.
PUB DATE Aug 81
NOTE 16p.; Paper presented at the Annual Meeting of the American Sociological Association (Toronto, Ontario, Canada, August, 1981).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Futures (of Society); *Needs; Social Problems; *Sociology; *Space Exploration
IDENTIFIERS *Space Colonization

ABSTRACT

This paper suggests that sociologists should become actively involved with the study of the future as a means for revitalizing the profession of sociology. One aspect of the future that may be most exciting and challenging is the development of human society and culture in extraterrestrial human communities. A unique combination of technological knowledge and capability, financial motivations, ideological rationale, and political motivation virtually assures humanization of extraterrestrial space within the foreseeable future. Space society and culture are likely to differ substantially from that which is found on earth because of the unique exigencies of extraterrestrial living--e.g., extraterrestrial habitats will have access to unlimited solar power; there will be extensive electronic and computer capabilities; limited land areas will preclude land intensive activities. There are three alternative approaches that might be taken in the development of extraterrestrial society. First, space society may be allowed to evolve with no preplanning. Second, goals for a humanistically satisfying society can be formulated and a complete society can be preplanned. Third, unique problems associated with extraterrestrial living can be identified and solved through societal mechanisms. If sociologists do not become actively involved, the first approach is likely to occur. Tasks that must be undertaken by sociologists if extraterrestrial society and culture are to be appropriately planned for the benefit of mankind are suggested. (Author/RM)

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THE FUTURE, EXTRATERRESTRIAL SPACE HUMANIZATION AND SOCIOLOGY

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ABSTRACT

The thesis for this paper is that sociologists should become actively involved with the study of the future as a means for revitalizing the profession of sociology. One aspect of the future that may be most exciting and challenging is the development of human society and culture in extraterrestrial human communities. A unique combination of technological knowledge and capability, financial motivations, ideological rationale and political motivation virtually assures humanization of extraterrestrial space within the foreseeable future. Space society and culture is likely to differ substantially from that which is found on Earth because of the unique exigencies of extraterrestrial living; an example is provided of the manner in which the absence of land-intensive agricultural activities may result in a completely electronic information use and storage system for a space habitat, leading to a variety of attitudes, norms, values and cultural traits that differ substantially from those that are commonly found on Earth. The author suggests three alternative approaches that might be taken in the development of extraterrestrial society and delineates some of the tasks that must be undertaken by sociologists if extraterrestrial society and culture are to be appropriately planned for the benefit of mankind.

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THE FUTURE, EXTRATERRESTRIAL SPACE HUMANIZATION AND SOCIOLOGY

> "...there will be a revolution in sociology in the 1970s with development of social indicators, their use in monitoring social trends, and involvement of sociologists as advisors to policy-makers and administrators in all major aspects of social life for the purpose of studying and shaping the future." (Wendell Bell and James A. Mau, The Sociology of the Future, pp. xii-xiii)

The decade for which Bell and Mau made this forecast has passed but, while some progress has been made in the study of social indicators and their use in monitoring social trends, there is scant evidence that sociologists have become vitally interested in studying and shaping the future; the revolution has not yet come to pass. This is unfortunate, for such a revolution might have precluded the lack of salience that sociology holds for so many of our college age students today and might have lessened the impact of declining enrollments that sociology departments are experiencing throughout the nation. The idealistic students who flocked to sociology in the early seventies must have been somewhat disappointed to find that we sociologists only wanted to study society while they wanted to change it; the more pragmatic students of the later seventies learned a lesson from their predecessors and shifted their attention to disciplines that held greater promise for the future.

A futures orientation for sociologists implies that one must shift "...the focus of sociology from the static study of the present and from the methodological dominance of prediction to the dynamic study of the future and to the methodological (and moral) dominance of control." (Bell and Mau, 1971, p. xiii) After all, the main reason for studying the future is to be able to do something about it. It is inappropriate to regard the future as an immutable fate that must be borne by man as it inexorably envelopes us in its mantle of time and events; on the contrary, the future is more appropriately regarded as a series of alternatives which arise from historical events as mediated by contemporary activities. By studying these alternatives, and evaluating them with respect to desirability and

undesirability, one is free to initiate action in pursuit of those that are desirable and to avoid those that are undesirable; this is the underlying and basic concept which gives meaning to the idea of directed social change. The direction, speed, intensity and nature of social change determines the future and it is appropriate for man to seek to determine the alternatives toward which change is leading and to seek to control this change in order to achieve a desirable future. Sociologists, as important sources of social change theory and knowledge, should be in the forefront of futurist thinking and activity.

Our theme for this meeting is "Discovering the Frontier of the Possible: Social Inventions for Solving Human Problems". What more appropriate intellectual setting could there possibly be for a discussion of "Social Futurology"? One aspect of the future that is likely to be of particular societal importance is the utilization and humanization of extraterrestrial space; indeed, this is often spoken of as "The High Frontier". (O'Neill, 1974 and 1978a) Space utilization refers to use of extraterrestrial space, its abundant resources, and its unique qualities for the benefit of man; space humanization refers to the use of extraterrestrial space for the purpose of permanent human habitation. The two concepts are closely interrelated; extensive space utilization can, and is now, taking place through the use of unmanned satellites and remotely controlled activities, but maximal utilization is contingent upon development of a permanent, in-space human work force. Space humanization is a necessary prerequisite for wide scale space utilization. While space utilization is likely to have important societal implications for us on Earth, it seems to me that space humanization should be of greatest interest to sociologists, and other social scientists, because the unique exigencies of extraterrestrial living will result in development of a society and culture that differs in important respect from any that are found on Earth. Before we place large numbers of people in space communities, we should carefully explore the alternative futures that may lie in store for them and attempt to introduce societal and cultural elements which are most likely to lead to survival and a satisfactory quality of life and life-style.

This should be an exciting challenge to social scientists.

When I express these ideas to my colleagues I am often met with a great deal of skepticism and disbelief; this is usually from people who have little knowledge of the technological progress that is being made in various space programs and of the capability that various nations have for sustaining large numbers of humans in the extraterrestrial environment. There is also a common tendency to assume that society and culture in space will be simple extensions of terrestrial society and culture and that all one need do is send people out there and to provide them with adequate habitats and life-support systems; this assumption is also widely shared by the technologically oriented writers who have contributed most to the literature of space "colonies". (O'Neill, 1977; Vajk, 1978; Heppenheimer, 1977; von Puttkamer, 1978b) Some of my less charitable colleagues make comments about Star Wars, Star Trek, or Close Encounters of the Third Kind, accompanied by the assertion that it is likely to be hundreds of years before such developments take place. Let me briefly summarize my reasons for believing that space industrialization and humanization will take place within the reasonably near future and give an example of the impact that unique exigencies of extraterrestrial living are likely to have upon human society and culture.

A combination of four factors underlie my position: 1) technological knowledge; 2) financial motivation; 3) ideological rationale and 4) political motivation.

1) Dr. Gerard K. O'Neill, a Princeton University physicist, originated the "High Frontier" concept of human colonies in space in the late sixties and has been its primary proponent since then. (O'Neill, 1974, 1977, 1978a, and 1978b) He has conducted extensive studies of the technological feasibility of constructing a space habitat of sufficient size to support 10,000 people on a permanent basis, with ninety percent of the raw materials for this habitat being obtained from extraterrestrial sources, such as the Moon and the asteroids, and the habitat being fabricated and constructed in the extraterrestrial environment. O'Neill has concluded that such

a project is feasible and that the technological knowledge for its implementation is currently in existence; the implication here is that a space humanization program is not contingent upon the development of new knowledge and is not likely to be halted by the requirement for a "knowledge breakthrough" such as might be the case with fusion energy efforts. In addition, development of the "mass-driver", a solar powered reaction engine for moving large masses through space, is currently in progress at MIT and the U.S. Space Shuttle Orbiter (soon to be launched, hopefully) constitutes the first stage in development of the transportation system that must support space humanization. (Disher, 1978; O'Leary, 1978)

2) The potential for reaping enormous financial profits through space utilization is attracting the attention of corporate entities and is likely to motivate them to invest corporate funds, and/or to urge the Congress to invest public moneys, in space utilization programs. (Gray, 1978; von Puttkamer, 1977; Gray and Krop, 1979) The availability of limitless solar energy, the unique extraterrestrial characteristics of zero-gravity and extremely low temperatures, the availability of a wide variety of industrial raw materials, and the ability to safely control toxic and radioactive wastes, all combine to facilitate production of a variety of industrial products in space and the development of new products that are not possible within the Earth's gravitational field. Probably one of the most attractive and immediate possibilities is the generation of electrical energy in space for use on Earth; the Department of Energy and NASA have recently concluded a $20 million study of the feasibility of constructing a Satellite Power System consisting of 60 solar satellites that could provide our nation with 5 gigawatts each on a continuous, 24 hour basis. (DOE/NASA, 1980)

3) Utilization of space holds the potential for providing alternative solutions to some of the world-wide problems that plague Earth. Conversion of solar energy in space to electricity for use on Earth would lessen our dependence on fossil fuels and contribute to a lessening of the conflicts that are associated with obtaining such fuels on Earth; use of extraterrestrial resources would lessen

the depletion rate of nonrenewable resources on Earth; removal of industry that produces noxious and hazardous wastes to extraterrestrial environment could help to ameliorate the environmental pollution problems that we are experiencing; production of electrical energy in space would lessen the pressures toward use of radioactive fuels for power generation purposes; new jobs and industries would be created with a potential for lessening the unemployment problem; and in the very long range, human communities in space hold a potential for relieving the population pressures upon the Earth's very finite carrying capacity.

4) Finally, space utilization and humanization efforts will undoubtedly fall under political control of those nations, or consortiums of nations, that have the potential, resources, and initiative to inaugurate such programs. At the present time the United States, the Soviet Union, Japan, France, China and probably West Germany are believed to possess the technological capability for launching space industrialization programs. NASA has, in the past, shown considerable interest in space industrialization and space colonization; more recently NASA has specifically disclaimed any interest in space colonization program (NASA, 1979) but is continuing with limited development of the Space Shuttle Orbiter. Japan, France, China and West Germany are not known to be actively engaged in such programs but it seems likely that the Soviets are. "For years the USSR has stated that its fundamental aim in space is to establish permanently manned space stations..." and "The Russians are not far from building the space station." (Covault, 1980. p. 96) Obviously the Soviets understand the advantages to be achieved through space utilization and colonization whether or not the other nations of the world do; it is likely too that they are cognizant of the fact that being first to colonize space would provide them with a propaganda advantage over the U.S. that overshadows that which we achieved with the Apollo Moon Mission. Space humanization and utilization programs will ultimately rest on political decisions, and as we become more aware of the potential advantages to be achieved from space, it seems reasonable to expect that the appropriate political decisions may be forthcoming in the relatively near future.

This combination of factors, technological knowledge and capability, financial motivation, ideological rationale, and political motivation seems to me to have the potential for becoming an irresistable force toward a large scale space utilization program. But why space humanization? Why not make use of unmanned satellites and remotely controlled or automated satellites? Much of the space utilization effort will, of course, be accomplished through the use of unmanned satellites, but unmanned satellites and remotely controlled space operations are not likely to provide for optimally efficient and maximal space utilization. Maximally, space utilization will necessitate use of resources mined from the Moon and the asteroids; the cost/benefit ratios, in terms of financial expenditures, resource depletion, and environmental degredation will simply be too unfavorable to support launching the required masses of materials from the Earth's surface. Procurement of the extraterrestrial resources, their processing in space, fabrication of space manufacturing facilities, and production of space products will necessitate the presence of a permanent, in-space work force which will number in the thousands of persons. Use of rotational work crews will become unfeasible because of the same unfavorable cost/benefit ratios that preclude maximal space utilization through the use of Earth manufactured and launched unmanned satellites; i.e., high costs, depletion of Earth resources, and environmental degredation associated with launches. If the work force is to be permanent it will necessitate the existence of an extraterrestrial habitat with a physical environment suitable for permanent human living and a social environment that incorporates all of those elements that make life worth living. Obviously, this necessitates some form of social organization and culture in extraterrestrial communities. Which brings us to the question of why the social organization and culture will not be that of whatever nation establishes the communities in space.

Certainly there will be cultural and societal continuities between Earth and extraterrestrial communities, but there are at least two reasons why significant differences will exist: 1) we are acquainted with many of the problems and difficulties

associated with society and culture on Earth and it seems reasonable that we should take whatever steps are necessary to minimize the transfer of these problems to space - we may not want to transfer society and culture from Earth to extraterrestrial communities if we can formulate better arrangements; 2) the forms that cultures and societies take are, at least in part, responses to the environment, and the unique environment of an extraterrestrial habitat is likely to differ significantly from any that are found on Earth and in which our extant societal and cultural forms have arisen.

Take, for instance, the following combination of factors: extraterrestrial habitats will have access to freely available and unlimited solar power; only the most vitally required materials will be available from Earth and the community will be completely self-sufficient; initial habitat development will include extensive electronic and computer capabilities; limited land areas within the habitat will preclude conduct of land-intensive activities and the habitat is not likely to have large commercial forests.

A variety of cultural and societal implications can be drawn from this unique combination of factors, however, we will deal only with the influence that the absence of forests is likely to have. Lack of forests will lead to minimal production and use of paper products. Combining this with an early tradition of electronic storage, processing, recovery and utilization of information, and with the low probability that paper products will be regarded as sufficiently vital to warrant their transport from Earth, one can foresee some striking and far reaching differences between life on Earth and life in the habitat. If all information is electronically stored it can be retrieved through the use of remote terminals, and there will be little need for centralized facilities where people must congregate in order to make use of information that is stored, retrieved and processed; this will include libraries, schools, offices, banks, publishing houses, newspapers, city and county clerk offices, and perhaps legislative and judicial facilities. The impact will be even greater if the electronic capability leads to lessening of face-to-face secondary group communications patterns in favor of electronic communications. Naturally, each of these facilities serves other

functions besides that of information storage and use, but information related activities are the primary functions and the secondary functions are likely to be shifted to other areas of society if the primary function can be handled in another manner. The implication is that alternative cultural traits related to work, transportation, education, and family are likely to characterize extraterrestrial living. Much of the work activity is likely to take place through the use of remote terminals in the home and architectural styles are likely to be such as to facilitate education, work and information related leisure activities in the home. Work patterns may be related to task accomplishment, rather than to expenditure of specific time blocks, resulting in entirely different attitudes toward work, fellow workers, company loyalities, and work scheduling; this can also apply to education, which may become a lifetime activity rather than preparation for some specific occupation in which one will engage for the rest of his life. Flexi-time and job sharing are likely to become the norm. Family norms and behavior patterns are also likely to be different in order to accommodate such a system and to facilitate accomplishment of all of these functions within the residential setting; the extraterrestrial family is likely to differ considerably from the terrestrial family in terms of functions, norms, attitudes, values and behavior patterns, and the traditional Earth family system, if transported intact to space, may be highly dysfunctional in the extraterrestrial environment. Other differences, certainly, are likely, but this should be sufficient to illustrate the manner in which the unique exigencies of extraterrestrial habitation will lead to alternative social and cultural forms. It seems quite reasonable to suggest that social scientists in general, and sociologists in particular, should be actively and intimately involved in the space humanization effort. What will be the role of sociology and sociologists in the space humanization effort?

At the present time there is no such role. Most of the material that has been written about humans in space has been authored by scientists and engineers. These are technologically oriented people who speculate freely, and in broad generalizations, about extra-

terrestrial society with a degree of naivete that is equivalent to the naivete that sociologists might display in discussing the use of the mass-driver. (O'Neill, 1977; Heppenheimer, 1977; Vajk, 1978) A number of social scientists, notably cultural anthropologists and economists, have published a few papers in disparate sources. (Maruyama, 1978; Maruyama and Harkins, 1975; Thomas, 1979) Dr. B.J. Bluth of California State University is offering a course titled, "The Industrialization and Settlement of Space" (Bluth, 1979) and another sociologist, Alvin Rudoff from San Jose State University, presented a paper before the American Astronautical Society, but planning for extraterrestrial society is not yet a serious or organized activity among social scientists.

Rudoff (Rudoff, 1977) has pointed out that sociologists possess knowledge and skills which can contribute to the space program and has suggested that such participation may be a necessary condition for the success of programs that involve permanent human settlements in space. Sociological contributions might, according to Rudoff, take place within three frameworks: space sociology from a terrestrial perspective, the study of small groups in confined spaces, and space sociology with an extraterrestrial perspective. I would like to direct the attention of this group to the extraterrestrial perspective and the contributions that sociologists might be able to make to planning for the society that will ultimately develop in extraterrestrial human communities.

There are at least three alternative approaches to the development of extraterrestrial society:

1) Space society may be allowed to evolve, with no preplanning effort, as an extension of the social organization which characterizes the rotating work crews that will construct the space habitat. Extraterrestrial society, then, will become an extension of Earth society with all of its faults and problems.

2) Goals for a humanistically satisfying society can be formulated and a complete society can be preplanned in such a way as to have a high probability for achieving the goals. The risk, here, is that unanticipated problems may be designed into the extraterrestrial society.

3) There are a number of unique problems associated with survival in the extraterrestrial environment that must be solved through societal mechanisms; there are also a number of dysfunctional aspects of terrestrial society that are undesirable in space and some functional aspects that may prove to be dysfunctional in the extraterrestrial environment. These can be identified and preplanning efforts would be aimed at minimizing their potential for harm to the extraterrestrial society.

The first approach, no preplanning, is the one that is most likely to occur if social scientists do not become actively and intellectually involved in the space effort. Technologically oriented scientists simply do not appreciate the complex relationship between society and technology and do not recognize that there are likely to be trade-offs between technological and social requirements. It would be an act of unconscionable neglect to allow extraterrestrial society to exhibit all of the defects that we know to characterize terrestrial society.

The second approach, preplan a goal oriented society, is, I should think, likely to be most exciting for social scientists. Man has never had an opportunity to design a society from "scratch", and development of a society in the initially sterile environment of space is about as close as man will ever come to such an adventure. However, such a task is mind-staggering in its immensity, it may not be within the state of the art at this time, and such a proposal is likely to engender a great deal of public (and professional) opposition, of an emotional nature, along with accusations that we are attempting to "play God".

From a pragmatic standpoint the third approach, plan for limited aspects of the extraterrestrial society, may be the most viable. A number of tasks will necessarily be required by this approach:

1) Identification of the unique characteristics of extraterrestrial living that will necessitate, or lead to, unique societal coping mechanisms and forms. The absence of land-intensive activities and its resultant electronic based information system is an example of one such possibility. There are many others: if

space communities are self-sufficient and independent of Earth, what form of economy is likely to develop and is it too likely to be independent of the economic systems on Earth? If commerce is a one-way system (space to Earth), and if the space economy is independent of Earth economy, what other form of dependency must be built into the extra-terrestrial society in order to induce the space citizens to continue to produce the products that we need on Earth? Would the unique characteristics of extraterrestrial living be compatible with any of the forms of government that are found on Earth, or would another governmental system be likely to arise?

2) Identification of social, causal, correlates of terrestrial social problems and human deviance, and preplanning for a society that may be better able to control these correlates. For example, it may be possible to minimize the incidence of criminal behavior by planning for the introduction of a cooperative economic model as opposed to the zero-sum conflict model that is most characteristic of Earth.

3) Establish limited goals for extraterrestrial society, such as elimination of prejudice and discrimination, and planning for an institutional structure that promotes attainment of the goal and which does not contain elements that support or foster contrary trends and social patterns.

4) Finally, it will be necessary to carefully examine the values, norms, attitudes and beliefs that must necessarily support the desired social model and to develop a socialization system through which these can be introduced into the extraterrestrial society.

This is a momentous undertaking for social scientists, but it is no less momentous than the technological undertakings that have brought us to this point in the space adventure. It will take a great deal of time, scholarly attention, and organization if it is to be carried out successfully and it is a vital aspect of social futurology. The only thing certain about the future is that it will be different than the present, but this does not relieve scholars and scientists of their responsibility for its formation. To paraphrase Gerard K. O'Neill, the planetary surface may not be the best place for industrialized man to live, and neither might be the future toward which we are heading. The key question facing sociology today is "are sociologists content to allow the future, and

the forthcoming extraterrestrial society, to develop as chance responses to economic or political decisions, or will they rise to the task of planning for a society that holds the promise for being free of some of the major dysfunctions that plague the world today?" Participation in the planning and pursuit of the future would, I should think, prove to be exciting and challenging, and may hold the potential for reestablishing the vitality of our profession. The futurist revolution in sociology, as suggested by Bell and Mau, should be the goal of all of us.

UP THE REVOLUTION!

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